

## WHAT IS CLAIMED IS:

1. A composition (10) to be mixed with a molten metal to make a metal matrix composite, the composition characterized by: a ceramic reinforcing filler (12), the ceramic reinforcing filler not being wettable by molten aluminum and/or not being chemically stable in molten aluminum, the ceramic reinforcing filler being coated with a ceramic material (11), the ceramic material being wettable by and chemically stable in molten aluminum.
- 5 2. The composition of Claim 1, further comprising a layer of a metal coated on the ceramic material.
3. The composition of Claim 1, wherein the ceramic reinforcing filler is selected from the group consisting of filler comprising sand, mullite, alumina, and silica.
- 10 4. The composition of Claim 2, wherein the ceramic reinforcing filler is selected from the group consisting of filler comprising sand, mullite, alumina, and silica.
- 5 5. The composition of Claim 3, wherein the ceramic material coated on the ceramic reinforcing filler is selected from the group consisting of annealed titanium diboride and annealed titanium nitride.
- 15 6. The composition of Claim 4, wherein the ceramic material coated on the ceramic reinforcing filler is selected from the group consisting of annealed titanium diboride and annealed titanium nitride.
7. The composition of Claim 6, wherein the metal is nickel.
- 20 8. A composition (20) to make a porous preform to be infiltrated by a molten metal to make a metal matrix composite, the composition characterized by: a ceramic reinforcing filler (23), the ceramic reinforcing filler not being wettable by molten aluminum, the ceramic reinforcing filler being coated with a ceramic material (21), the ceramic material being wettable by molten aluminum.
- 25 9. The composition of Claim 8, further comprising a layer of a metal (21) coated on the ceramic material.
10. The composition of Claim 8, wherein the ceramic reinforcing filler is selected from the group consisting of filler comprising sand, mullite, alumina, and silica.
- 30 11. The composition of Claim 9, wherein the ceramic reinforcing filler is selected from the group consisting of filler comprising sand, mullite, alumina, and silica.

12. The composition of Claim 10, wherein the ceramic material coated on the ceramic reinforcing filler is selected from the group consisting of boron carbide, amorphous titanium diboride and amorphous titanium nitride.

5 13. The composition of Claim 11, wherein the ceramic material coated on the ceramic reinforcing filler is selected from the group consisting of boron carbide, amorphous titanium diboride and amorphous titanium nitride.

14. The composition of Claim 13, wherein the metal is nickel.

10 15. A process for coating a ceramic reinforcing filler with a ceramic material, the process characterized by the steps of: (a) positioning the ceramic reinforcing filler in a vacuum chamber; and (b) vaporizing a ceramic material in the vacuum chamber so that the ceramic material deposits on the ceramic reinforcing filler.

15 16. The process of Claim 15, wherein the ceramic reinforcing filler is selected from the group consisting of filler comprising sand, mullite, alumina, and silica and wherein the ceramic material is selected from the group consisting of boron carbide, a mixture of boron carbide and an aluminum/boron carbide reaction product, titanium diboride and titanium nitride.

20 17. The process of Claim 15, further characterized by the step of heating the coated ceramic reinforcing filler at a temperature sufficient to anneal the coating of ceramic material on the ceramic reinforcing filler.

18. The process of Claim 16, wherein the ceramic material is selected from the group consisting of titanium diboride and titanium nitride, further characterized by the step of heating the coated ceramic reinforcing filler at a temperature sufficient to anneal the coating of ceramic material on the ceramic reinforcing filler.

25 19. A metal matrix composite article made by a process characterized by the steps of: (a) mixing a molten aluminum or molten aluminum alloy with the composition of any of Claims 1-7 to form a mixture thereof; and (b) cooling the mixture to form the metal matrix composite article.

20. A metal matrix composite article made by a process characterized by the steps of:

(a) forming a porous preform from the composition of any of Claims 8-14; (b) contacting the porous preform with molten aluminum or molten aluminum alloy so that the molten aluminum or molten aluminum alloy infiltrates into the porous preform to produce an

5 infiltrated preform; and (c) cooling the infiltrated preform to form the metal matrix composite article.